

What is claimed is:

1. A method of manufacturing a commutator of a rotary electric machine which includes a plurality of commutator segments, a plurality of metal terminal members each of which has a nail to be connected to one of armature coils of the rotary electric machine, an insulating resinous member which supports the commutator segments and the metal terminal member, said method comprising:

a step of forming a first unitary material having nail portions for the plurality of metal terminals, said first unitary material being flat with the nails extending radially outward;

a step of forming a second unitary material for the commutator segments;

a step of fixing the first unitary material and the second unitary material together to form a pre-commutator unit so that the nails extend radially outward from the periphery of the pre-commutator unit;

a step of inserting the pre-commutator unit between a pair of dies so that the dies hold the nails without a substantial gap; and

a step of charging liquid resinous material into the inside of the dies to mold the pre-commutator unit.

2. The method as claimed in claim 1, further comprising a step of bending the nails to stay within the periphery of the pre-commutator unit.

3. The method as claimed in claim 1,

wherein said first unitary material comprises a plurality of terminal members and a plurality of arc-shaped members respectively connecting the terminal members.

4. The method as claimed in claim 3, further comprising a step of removing the arc-shaped members.

5. The method as claimed in claim 1,
wherein said step of forming the first unitary material comprises a step of forming terminal members that has the nails and a step of forming an intermediate connection member to be disposed between the second unitary material and the terminal members.

6. A method of manufacturing a commutator of a rotary electric machine which includes a plurality of commutator segments, a plurality of metal terminal members each of which has a nail to be electrically connected to one of armature coils of the rotary electric machine, an insulating resinous member which supports the commutator segments and the metal terminal member, said method comprising:

a step of forming a first unitary material having nail portions for the plurality of metal terminals, said first unitary material being flat with the nails extending radially outward;

a step of forming a second unitary material for the commutator segments;

a step of fixing the first unitary material and the second unitary material together to form a pre-commutator unit so that the nails extend radially outward from the periphery of the pre-commutator unit;

a step of sandwiching the pre-commutator unit between a pair of dies without a substantial gap; and

a step of charging liquid resinous material into the inside of the dies to

mold the pre-commutator unit.

7. The method as claimed in claim 6, further comprising a step of bending the nails to stay within the periphery of the pre-commutator unit.

8. The method as claimed in claim 7,

wherein said first unitary material comprises a plurality of terminal members and a plurality of arc-shaped members respectively connecting the terminal members.

9. The method as claimed in claim 8, further comprising a step of removing the arc-shaped members.

10. A commutator of a rotary electric machine having a plurality of armature coils, said commutator comprising:

a plurality of commutator segments disposed in a circumferential direction;

a metal plate terminal unit that includes a plurality of intermediate connection members respectively disposed to be in contact with said commutator segment, a plurality of terminal members respectively disposed to be in contact with said intermediate connection member;

an insulating resinous member, having a cylindrical outer periphery, for insulating and supporting said commutator segments and said terminal members together;

wherein:

each of said terminal members has an L-shaped nail made of a flat conductive member to be connected to one of armature coils of the rotary

electric machine; and

each of said L-shaped nail has a first portion extending outward in a radial direction and a second portion extending in an axial direction away from said commutator segments within a circumference of the cylindrical outer periphery of said insulating resinous member.

11. The commutator as claimed in claim 10,

wherein:

said plurality of terminal members comprises first terminal members and second terminal members alternately in contact with said intermediate members; and

each of second terminal members has an arm connecting one of said intermediate members being in contact with one of said first terminal members that is disposed at a side diagonally opposite thereto.

12. A method of manufacturing the commutator as claimed in claim 11, said method comprising:

a step of forming a first unitary material for the commutator segments each of which having a commutator surface and a projection extending in an axial direction away from the commutator surface;

a step of forming a second unitary material having a plurality of axially projecting contact portions;

a step of forming a third unitary material having a plurality of flat nails extending radially outward;

a step of fixing the first, second and third unitary materials together to form a pre-commutator unit so that the nails extend radially outward from the periphery of the pre-commutator unit; and

a step of inserting the pre-commutator unit between a pair of dies so that the dies hold the nails without a gap; and

a step of charging liquid resinous material into the inside of the dies to mold the pre-commutator unit.